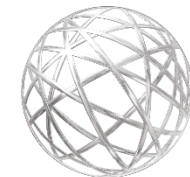


Importance of Transparent and Standardised Data Analysis for Decarbonisation of the Aluminium Sector

Prepared by Marlen Bertram and Linlin Wu

Presented by: Marlen Bertram (IAI)



INTERNATIONAL
ALUMINIUM

About me

Marlen Bertram

Director – Scenarios and Forecasts

Responsibilities at IAI: I'm responsible for IAI's material flow analysis, including the Alucycle visualisation and developing scenarios and forecasts for the industry. I also manage work related to aluminium recycling and greenhouse gas modelling.

Education: Environmental Science and Process Engineer from Brandenburg University of Technology (Germany)

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Agenda

- The Role of IAI
- IAI Product Carbon Footprint Guidelines
- Greenhouse Gas Data Collection and Publication
- IAI Greenhouse Gas Pathways
- Mission Possible Partnership
- Actions in the Industry



About the International Aluminium Institute (IAI)



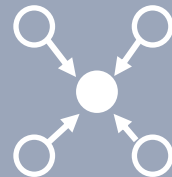
The International Aluminium Institute (IAI) is the only body representing the global primary aluminium industry.



Since its foundation in 1972, members of the IAI have been companies engaged in the production of bauxite, alumina and aluminium, the recycling of aluminium and/or fabrication of aluminium, or as joint venture partners.



Current IAI membership represents all major regions of global bauxite, alumina and aluminium production.



The IAI has been key to bringing the industry together on shared purpose over the past 50 years.

What we do

Raise awareness of Aluminium's unique and valuable properties

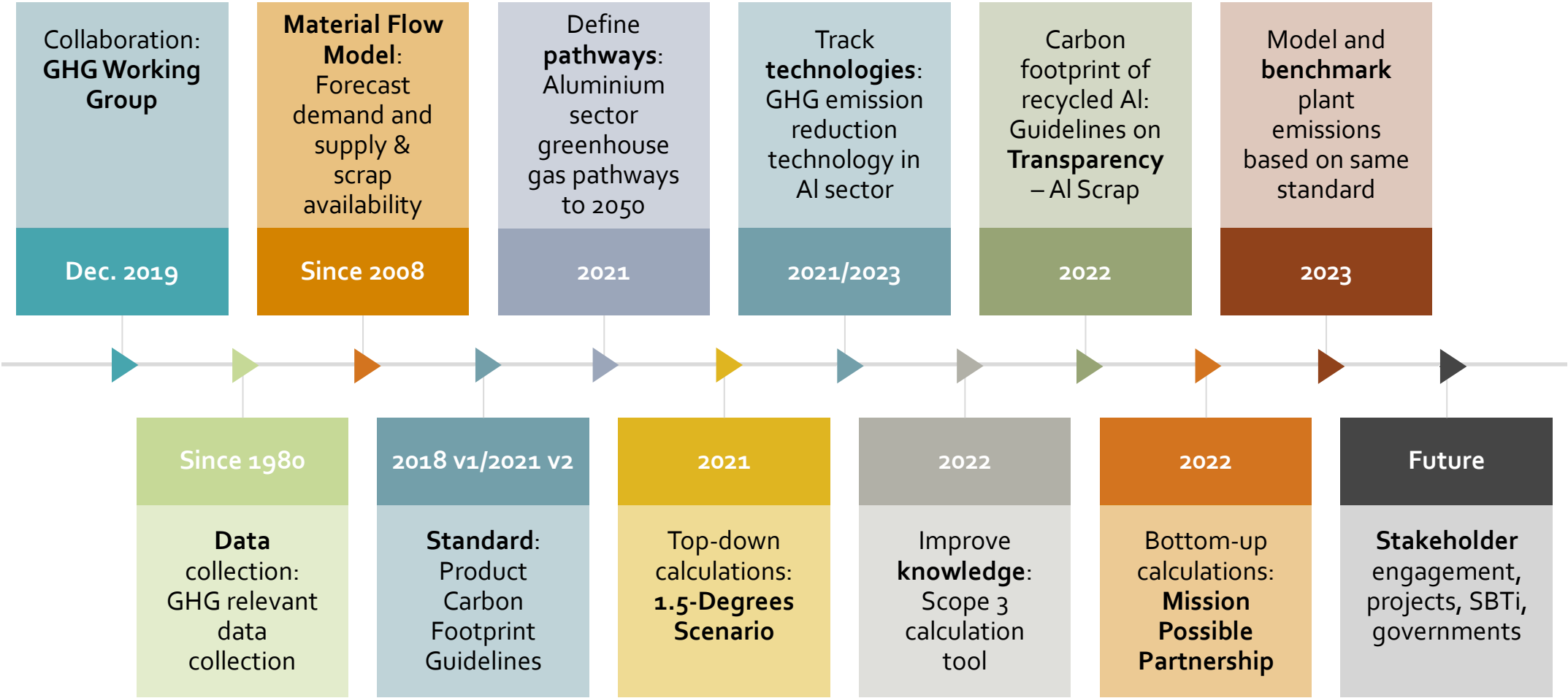
Foster collaboration for sustainability

Support informed decision making

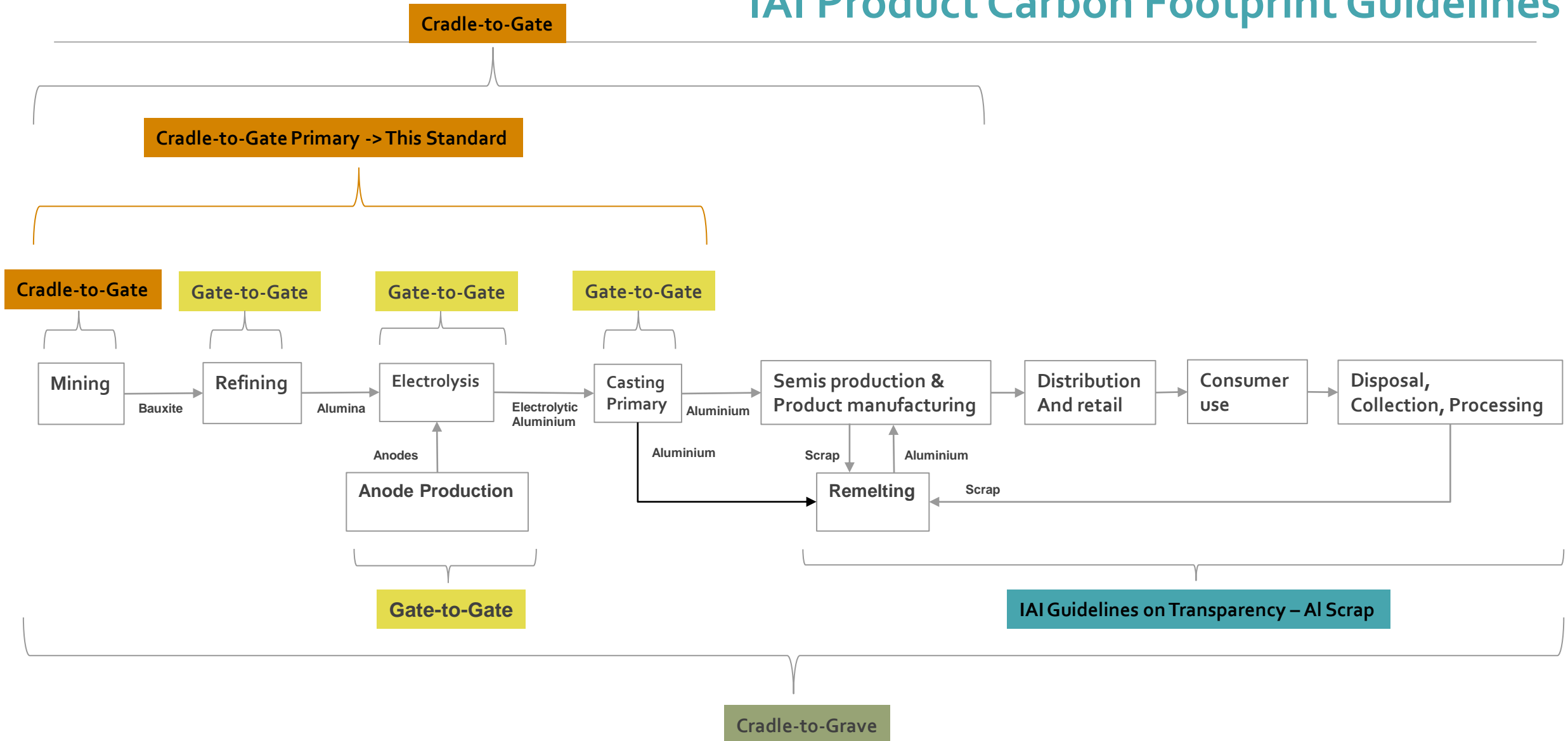
Contribute to Aluminium wide standards and regulation

 GREENHOUSE GASES	 CONSUMER HEALTH	 BIODIVERSITY	 BAUXITE RESIDUE	 WATER	 BAUXITE RESIDUE USE	 COMMUNITIES	 ELECTRIC ENERGY	 ENERGY	 ENVIRONMENTAL HEALTH	 FLUORIDES
 INDUSTRY & SUSTAINABILITY	 LIFECYCLE	 MATERIAL FLOW ANALYSIS	 MINING	 OCCUPATIONAL HEALTH	 RECYCLING	 SAFETY	 SCENARIOS & FORECASTS	 SPENT POT LINING		

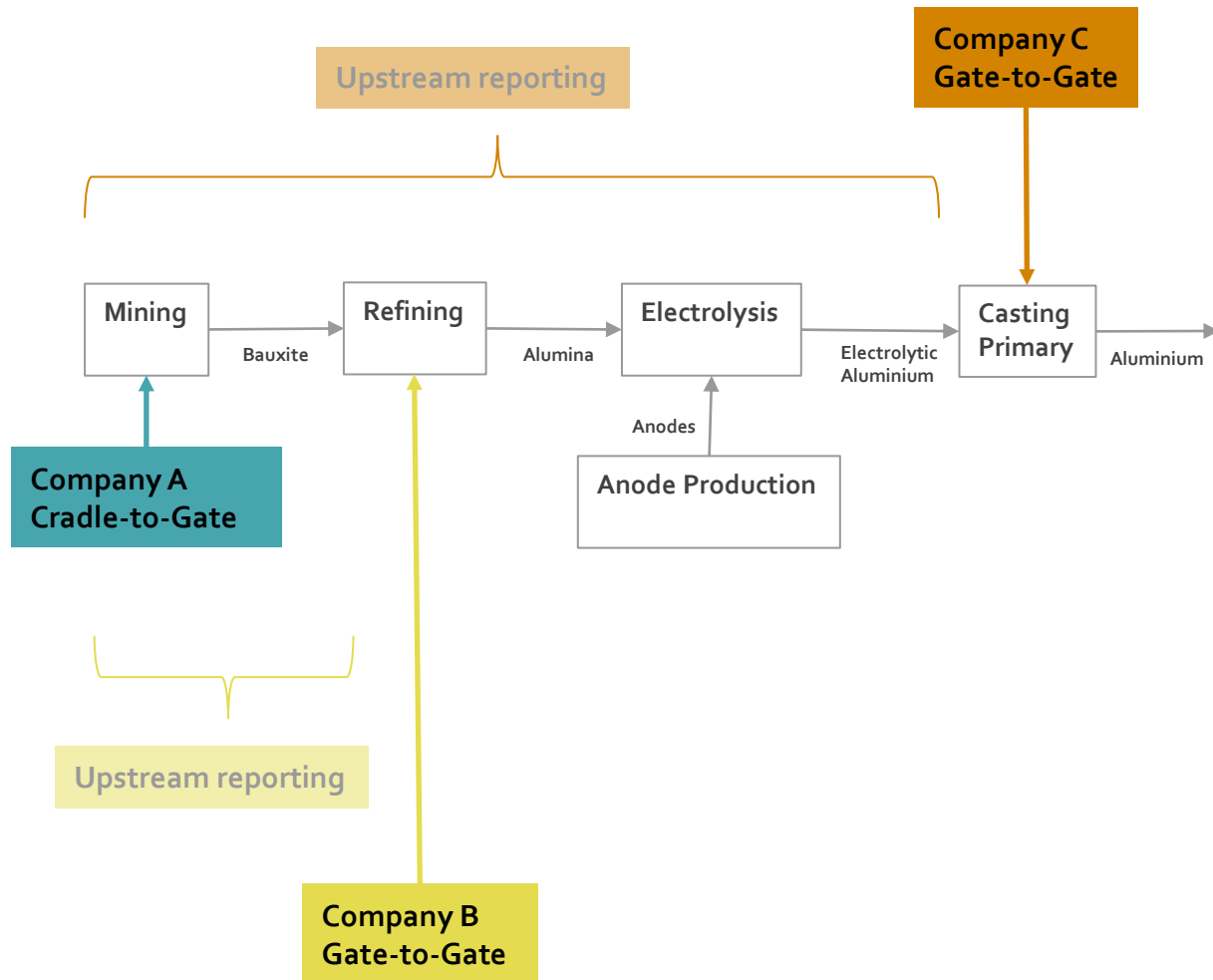
Limit Global Warming to a Maximum of 1.5-Degrees – The Role of IAI



IAI Product Carbon Footprint Guidelines



IAI Product Carbon Footprint Guidelines



Applicable to a given mass of primary aluminium and precursor products (Bauxite, Alumina, Anodes, Electrolytic Aluminium):

- Direct emissions from process, inclusive of emissions from fuel combustion
 - [Scope 1](#)
- Emissions related to energy production
 - [Scope 1](#) for self-generated energy
 - [Scope 2](#) for purchased energy
 - Plus, [Scope 3 Category 3](#) fuel and energy-related activities (not included in Scope 1 and 2)
- Others
 - [Scope 3, Category 1](#) (purchased goods), [4](#) (upstream transportation and distribution) and [\(5 – waste generated in operation\)](#)

Scope terminology – GHG Protocol Corporate Standard

IAI GHG Data Collection and Publishing

Period		Electricity – Indirect	Perfluorocarbon (PFC) – Direct	Process (CO ₂) – Direct	Ancillary Materials – Indirect	Thermal Energy – Direct/Indirect	Transport – Indirect	Total – Cradle to Gate
2021	tonnes of CO ₂ e per tonne of primary aluminium							
	Mining	0.01			<<0.01	0.04		0.04
	Refining	0.4			0.4	1.6	0.2	2.7
	Anode Production	0.04		0.1	0.7	0.1		0.9
	Electrolysis	10.3	0.8	1.5	0.1		0.2	12.9
	Casting	0.04			<<0.01	0.1		0.1
	Primary Aluminium	10.7	0.8	1.7	1.2	1.8	0.4	16.6

Data Collection

Annual

Every 2 years

Every 5 years

IAI Greenhouse Gas Pathways to 2050

➤ Data driven approach

➤ Establish the sector baseline

➤ Consider the different positions

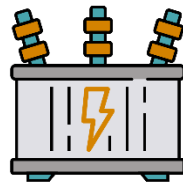
➤ Industry data & input

➤ Top-down scenario analysis – IEA

➤ Identify variety of pathways

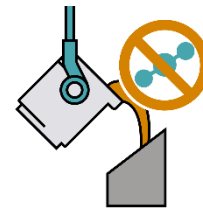
2018:
1.1 billion
tonnes of
CO₂e

700 million



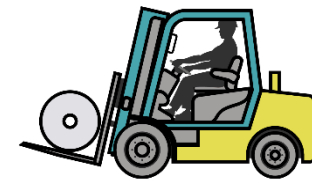
Electricity

300 million



Process & Thermal

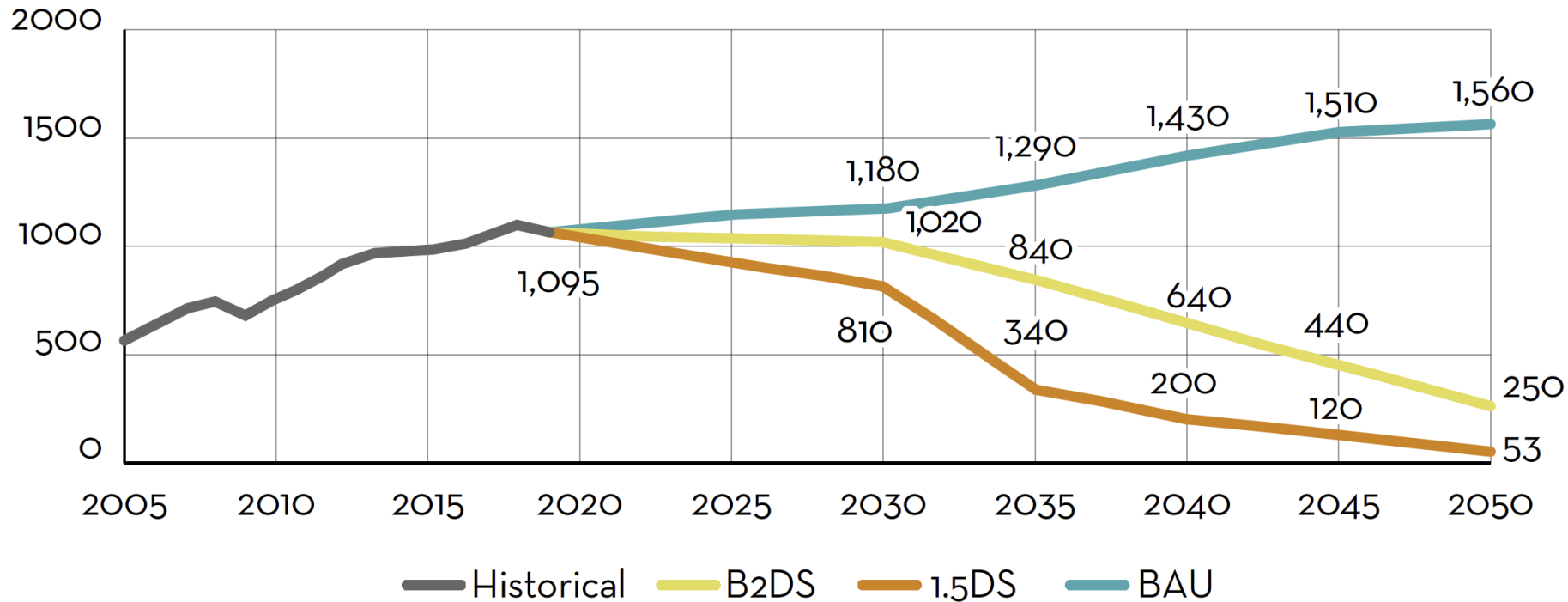
<100 million



Ancillary & Transport

IAI Emissions Scenarios

Aluminium Sector (million tonnes CO₂e)



Legend for scenarios:

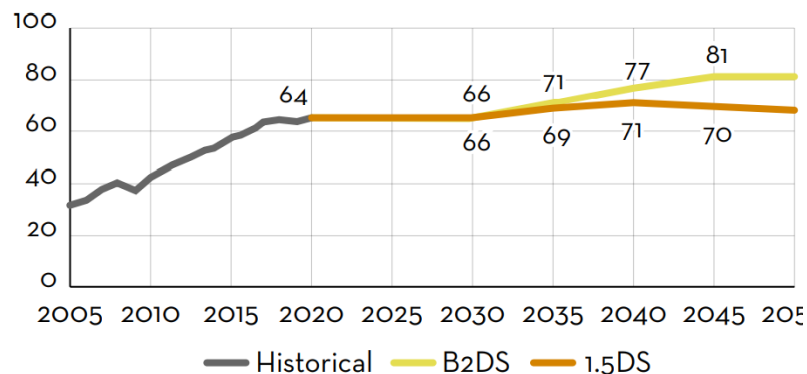
- BAU (Teal)
- B2DS (Yellow-Green)
- 1.5DS (Orange)

IAI GHG Pathways to 2050 (IAI, 2021)

IAI 1.5 Degree Scenario Highlights

Primary

Primary Aluminium (million tonnes)

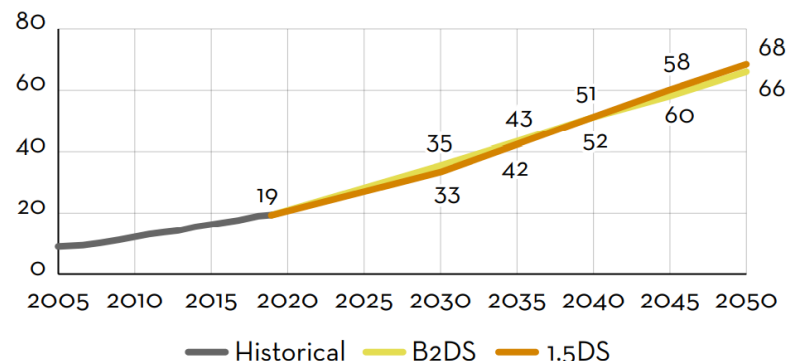


Primary production has to grow marginally to meet demand...
...while also decarbonizing to maximum extent

[IAI Alucycle \(IAI, 2023\)](#)

Post-consumer scrap

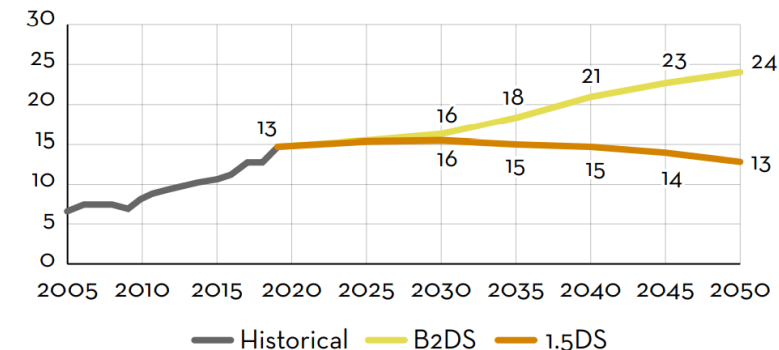
Post-consumer scrap (million tonnes)



Major increase in processing of Post-consumer scrap is a key for industry decarbonisation

Pre-consumer scrap

Pre-Consumer scrap* (million tonnes)



Pre-consumer scrap stays flat in 1.5 degree scenario due to growing production efficiency

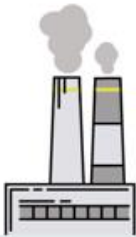
*Pre-consumer scrap generated during the production of final products from semis

Building On IAI Scenarios & Pathways

Pathway 1
**Electricity
decarbonization
potential**



Pathway 2
**Direct
emissions
potential**



Pathway 3
**Recycling
& resource
efficiency
potential**



Inform company GHG/climate change plans



Basis for emerging initiatives & methodologies



Collective understanding & action



Demonstrate the industry has a credible sector pathway



Shift to implementation – policy, finance, partnerships



Building on industry fact-base & engaging with key stakeholders

Sectoral Transition Strategy by Mission Possible Partnership

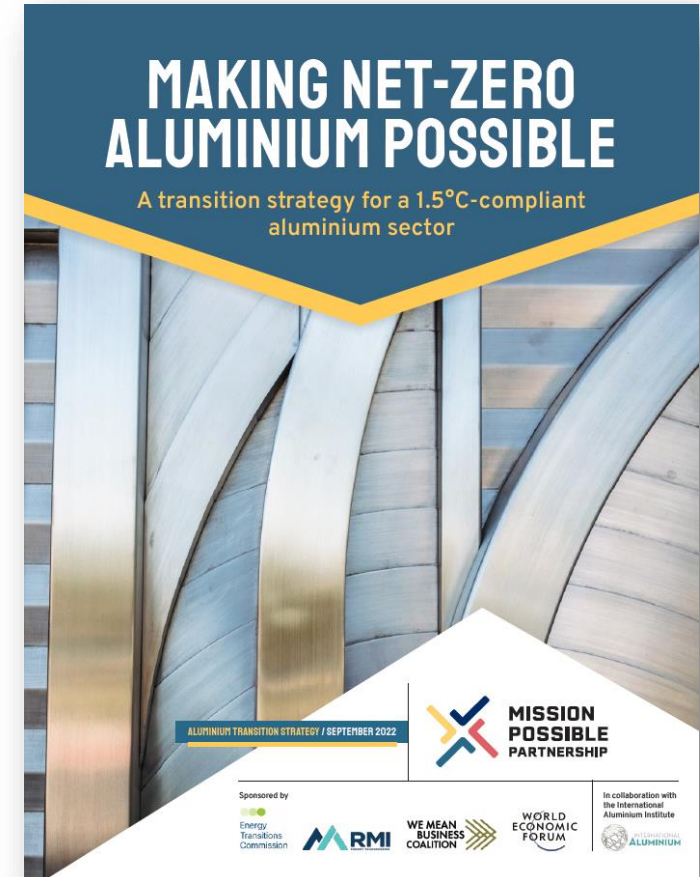
- **A Sector Transition Strategy**

Inform decision makers from the public and private sectors about the nature, timing, cost, and scale of actions necessary to deliver net zero within the sector by 2050 and to comply with a 1.5°C target

- Based on **Aluminium Sector Transition Strategy Model** and informed by International Aluminium Institute for the “1.5 Degrees Scenario”

- Focus on **technologies** to deliver near-zero-emissions

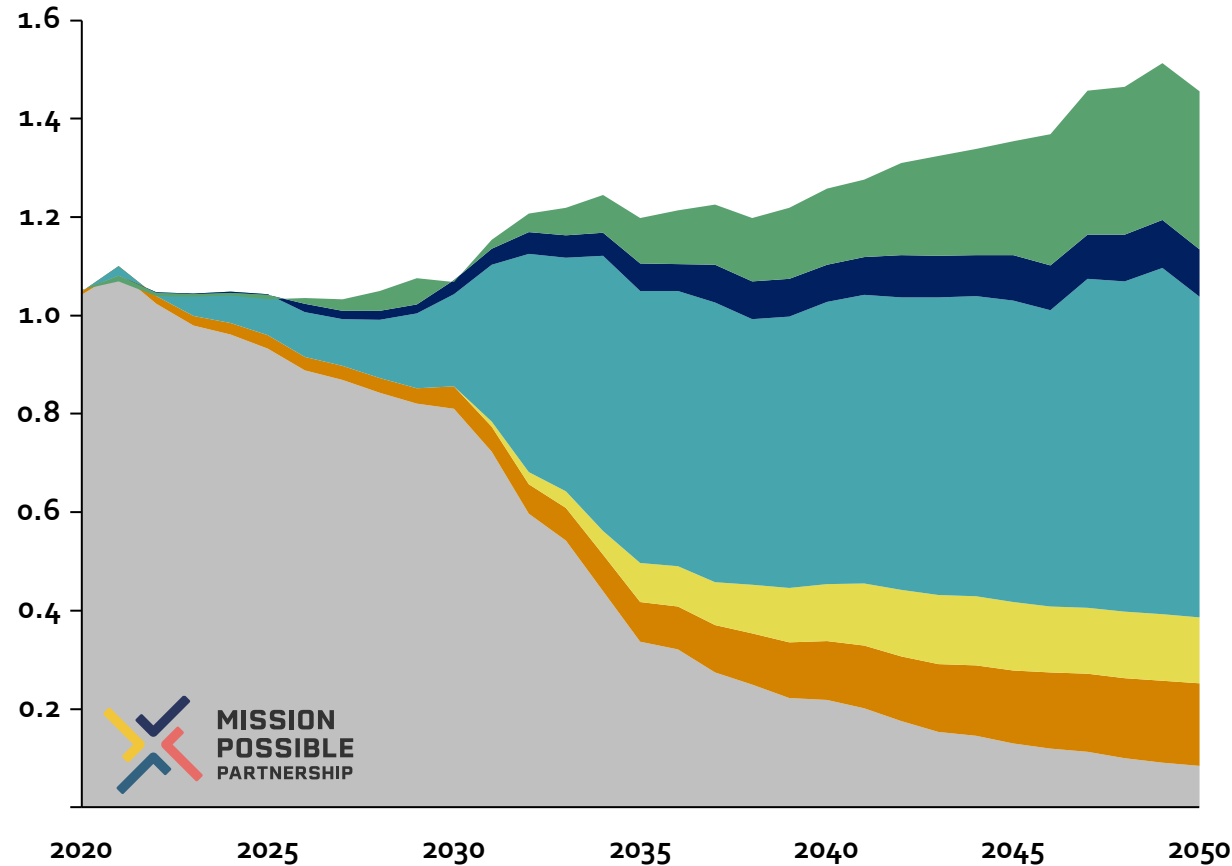
- Extensive **engagement with the wider aluminium community** and aluminium sector experts as part of the Aluminium for Climate initiative (initiated by the World Economic Forum in 2019).



Sectoral Transition Strategy by Mission Possible Partnership

2020-2050 direct and indirect emissions for the aluminium sector

GtCO₂e/yr



% of cumulative emissions reduction (2022-2050)

Material & Resource Efficiency

15-20%

Improved recycling rates
Higher design efficiency

Low Carbon Refineries

5-10%

Heat recovery and zero-emissions boilers
Zero-emissions calciners

Low Carbon Power

55-60%

New grid connections or CCS
Nuclear small modular reactors

Low Carbon Smelters

10%

Inert anodes
CCS retrofits

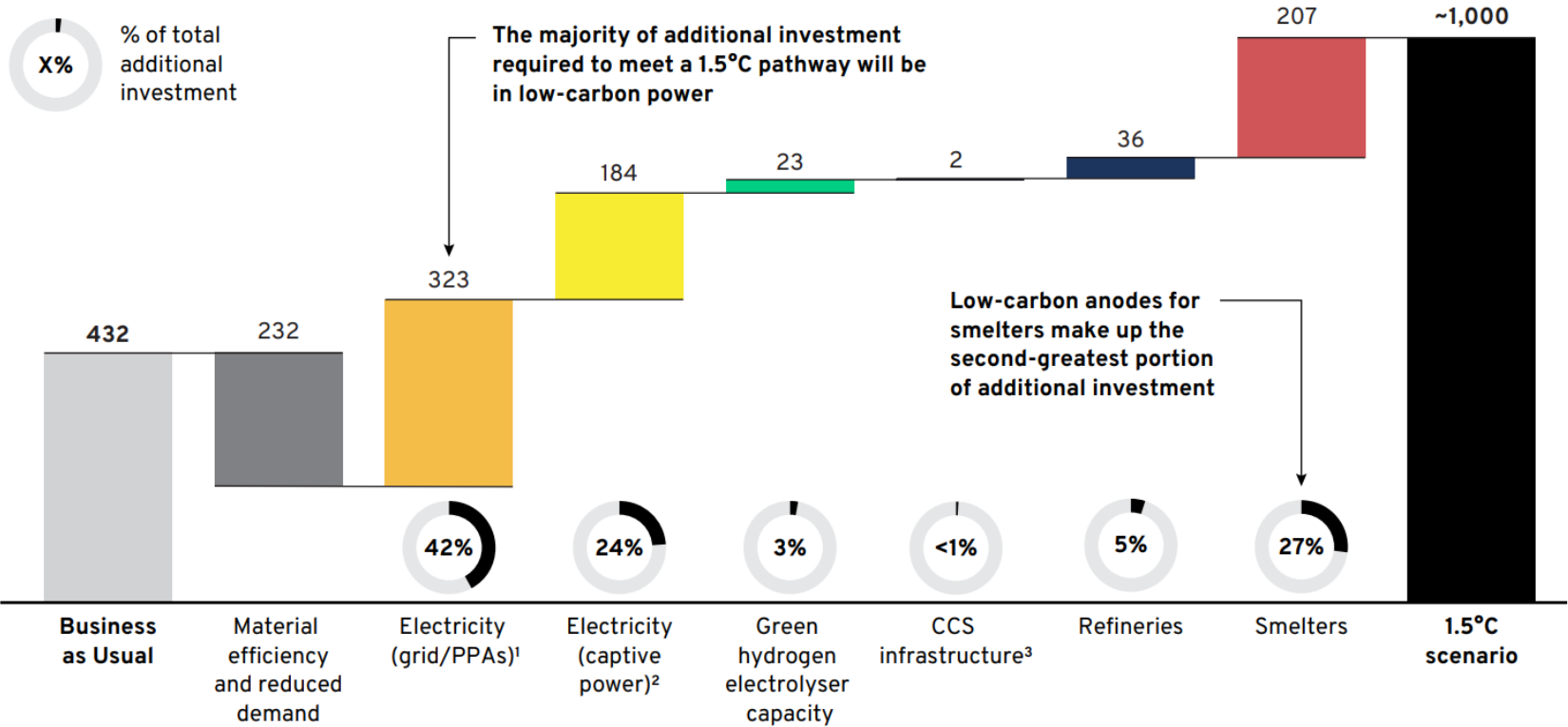
Additional Fuel Switching

10-15%

Low-carbon electricity or hydrogen
across wider value chain

Required Investments

Cumulative investments required in the primary aluminium sector, billion \$, 2020-50



¹ Uses an assumption that refineries will use 100% electricity from PPAs.
² Includes investments in captive power such as fossil CCS or nuclear SMR.
³ Uses an estimate of \$5/t CO₂ capital expenditure for CO₂ transport and storage infrastructure.

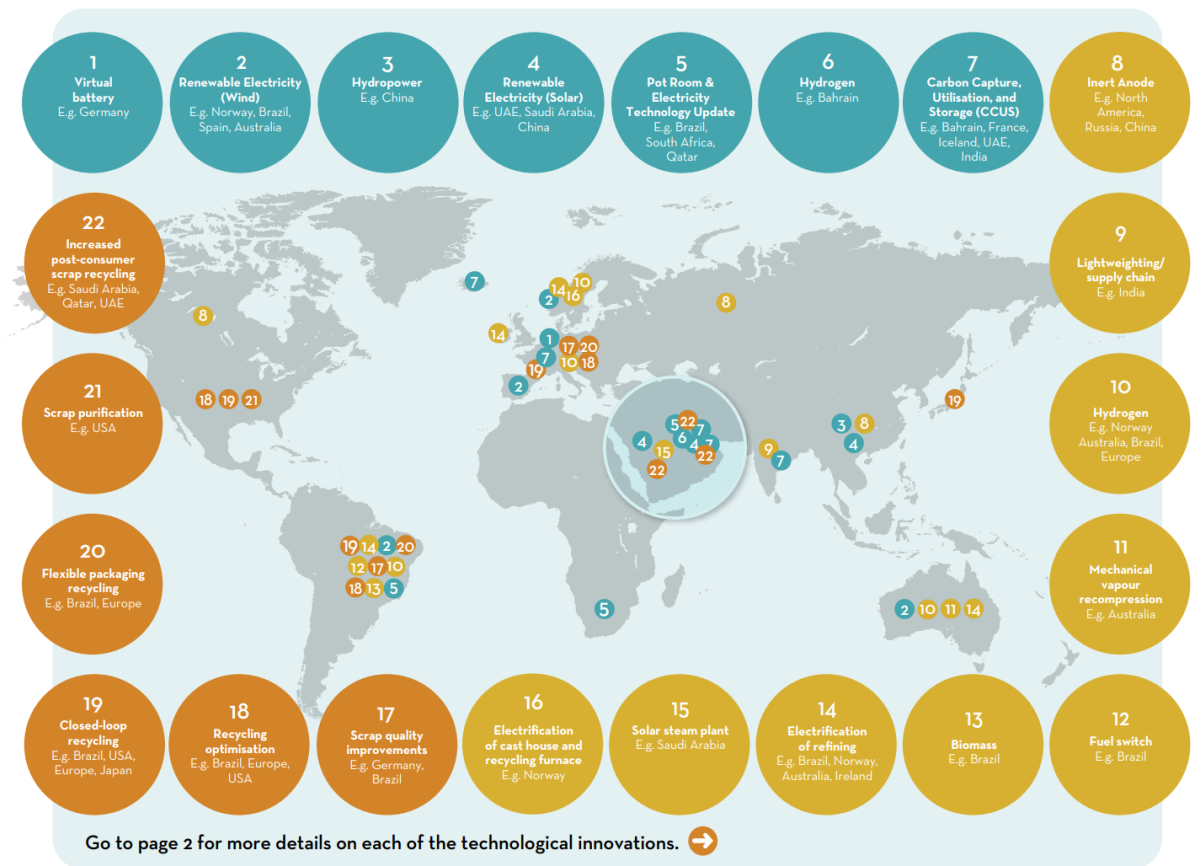
Source: Aluminium Sector Transition Strategy Model (2022)

GHG Reduction Projects

2020 -> 16 Project



2022/2023 -> 50 Projects

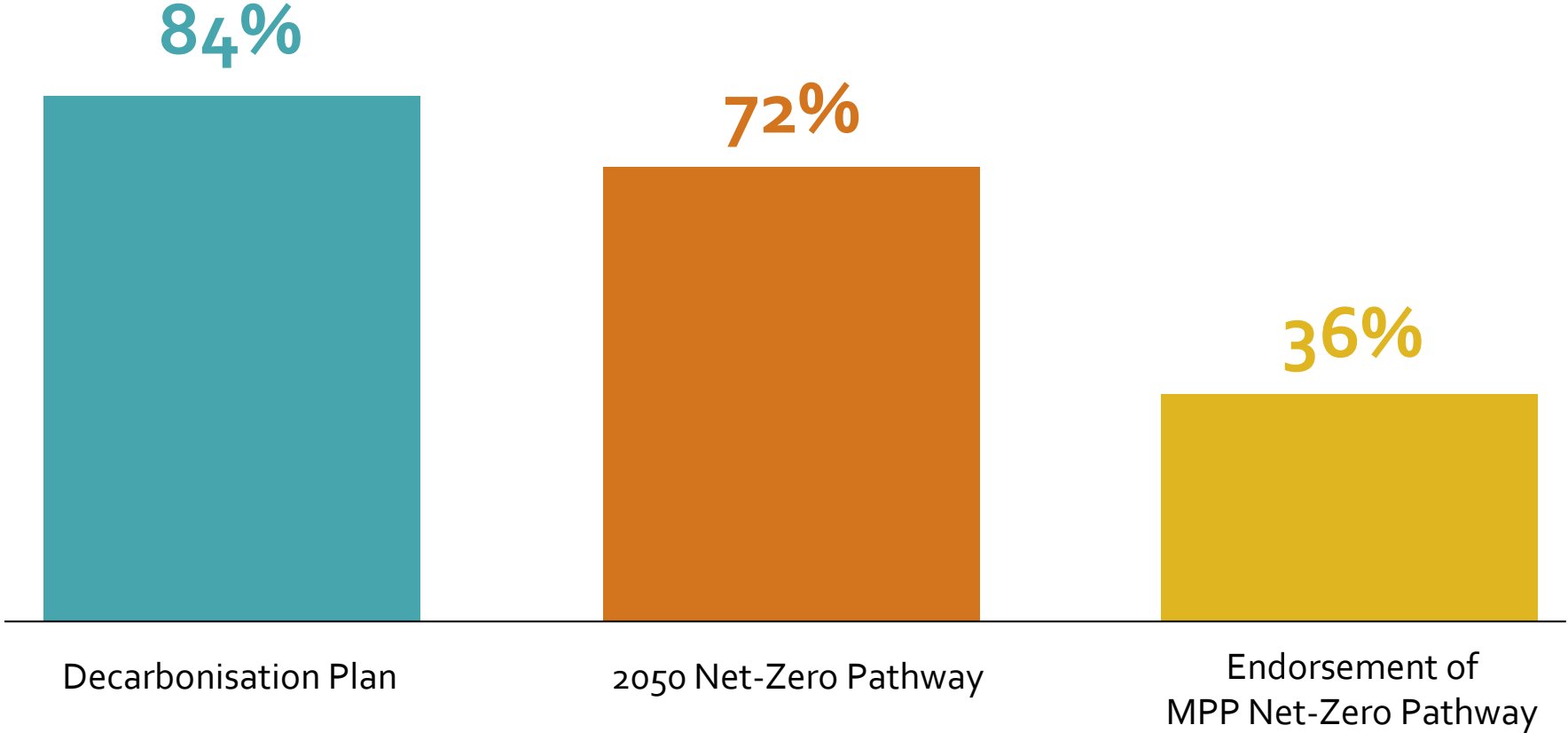


● Electricity decarbonisation

● Direct emissions

● Recycling

IAI Membership Decarbonisation Plans



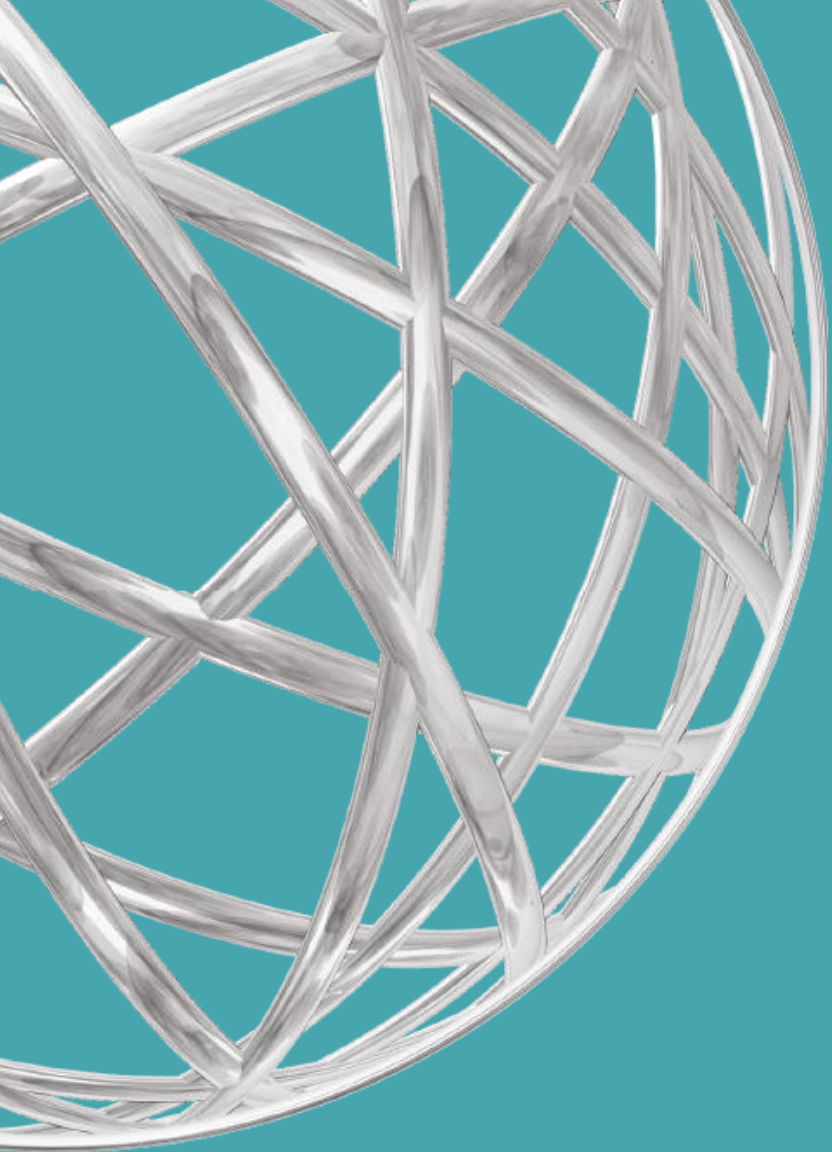
IAI Chaired Sessions

- **Aluminum Waste Management and Utilization**

Tuesday March 21 at 8:55am

- **Aluminum Industry Emissions Measurement, Reporting & Reduction**

Tuesday March 21 at 2:30pm



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linkedin.com/company/international-aluminium-institute/

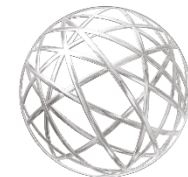


[@TheAluminiumStory](https://www.youtube.com/@TheAluminiumStory)

Thank you

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